Summary for Subcatchment 1: EDA

Runoff = 0.60 cfs @ 12.10 hrs, Volume= 0.045 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
10,932	98	Paved roads w/curbs & sewers, HSG A
10,431	49	50-75% Grass cover, Fair, HSG A
21,363	74	Weighted Average
10,431		48.83% Pervious Area
10,932		51.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2: EDA

Runoff = 0.95 cfs @ 12.10 hrs, Volume= 0.070 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
7,618	98	Paved roads w/curbs & sewers, HSG B
22,515	69	50-75% Grass cover, Fair, HSG B
1	85	Gravel roads, HSG B
30,134	76	Weighted Average
22,516		74.72% Pervious Area
7,618		25.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3: EDA

Runoff = 0.22 cfs @ 12.10 hrs, Volume= 0.017 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
4,031	98	Paved roads w/curbs & sewers, HSG A
3,832	49	50-75% Grass cover, Fair, HSG A
7,863	74	Weighted Average
3,832		48.73% Pervious Area
4,031		51.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4: EDA

Runoff = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
5,075	98	Paved roads w/curbs & sewers, HSG A
13,358	49	50-75% Grass cover, Fair, HSG A
303	76	Gravel roads, HSG A
18,736	63	Weighted Average
13,661		72.91% Pervious Area
5,075		27.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5: EDA

Runoff = 0.21 cfs @ 12.10 hrs, Volume= 0.016 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
4,562	49	50-75% Grass cover, Fair, HSG A
3,988	98	Paved roads w/curbs & sewers, HSG A
8,550	72	Weighted Average
4,562		53.36% Pervious Area
3,988		46.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP1: Wetland D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.490 ac, 51.17% Impervious, Inflow Depth = 1.10" for 2y24h event
Inflow = 0.60 cfs @ 12.10 hrs, Volume= 0.045 af
Outflow = 0.60 cfs @ 12.10 hrs, Volume= 0.045 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Wetland C-B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.692 ac, 25.28% Impervious, Inflow Depth = 1.22" for 2y24h event
Inflow = 0.95 cfs @ 12.10 hrs, Volume= 0.070 af
Outflow = 0.95 cfs @ 12.10 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Offsite

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.181 ac, 51.27% Impervious, Inflow Depth = 1.10" for 2y24h event
Inflow = 0.22 cfs @ 12.10 hrs, Volume= 0.017 af
Outflow = 0.22 cfs @ 12.10 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Wetland C

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.430 ac, 27.09% Impervious, Inflow Depth = 0.56" for 2y24h event
Inflow = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af
Outflow = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Int. Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.196 ac, 46.64% Impervious, Inflow Depth = 0.99" for 2y24h event
Inflow = 0.21 cfs @ 12.10 hrs, Volume= 0.016 af
Outflow = 0.21 cfs @ 12.10 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: EDA Runoff Area=21,363 sf 51.17% Impervious Runoff Depth=2.52"
Tc=6.0 min CN=74 Runoff=1.42 cfs 0.103 af

Subcatchment 2: EDA Runoff Area=30,134 sf 25.28% Impervious Runoff Depth=2.70"
Tc=6.0 min CN=76 Runoff=2.15 cfs 0.156 af

Subcatchment 3: EDA Runoff Area=7,863 sf 51.27% Impervious Runoff Depth=2.52"
Tc=6.0 min CN=74 Runoff=0.52 cfs 0.038 af

Subcatchment 4: EDA Runoff Area=18,736 sf 27.09% Impervious Runoff Depth=1.64"
Tc=6.0 min CN=63 Runoff=0.77 cfs 0.059 af

Subcatchment 5: EDA Runoff Area=8,550 sf 46.64% Impervious Runoff Depth=2.35"
Tc=6.0 min CN=72 Runoff=0.53 cfs 0.038 af

Reach DP1: Wetland D Inflow=1.42 cfs 0.103 af
Outflow=1.42 cfs 0.103 af

Reach DP2: Wetland C-B Inflow=2.15 cfs 0.156 af
Outflow=2.15 cfs 0.156 af

Reach DP3: Offsite Inflow=0.52 cfs 0.038 af
Outflow=0.52 cfs 0.038 af

Reach DP4: Wetland C Inflow=0.77 cfs 0.059 af
Outflow=0.77 cfs 0.059 af

Reach DP5: Int. Stream Inflow=0.53 cfs 0.038 af
Outflow=0.53 cfs 0.038 af

Total Runoff Area = 1.989 ac Runoff Volume = 0.394 af Average Runoff Depth = 2.38"
63.48% Pervious = 1.263 ac 36.52% Impervious = 0.726 ac

Summary for Subcatchment 1: EDA

Runoff = 1.42 cfs @ 12.09 hrs, Volume= 0.103 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
10,932	98	Paved roads w/curbs & sewers, HSG A
10,431	49	50-75% Grass cover, Fair, HSG A
21,363	74	Weighted Average
10,431		48.83% Pervious Area
10,932		51.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2: EDA

Runoff = 2.15 cfs @ 12.09 hrs, Volume= 0.156 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
7,618	98	Paved roads w/curbs & sewers, HSG B
22,515	69	50-75% Grass cover, Fair, HSG B
1	85	Gravel roads, HSG B
30,134	76	Weighted Average
22,516		74.72% Pervious Area
7,618		25.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3: EDA

Runoff = 0.52 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
4,031	98	Paved roads w/curbs & sewers, HSG A
3,832	49	50-75% Grass cover, Fair, HSG A
7,863	74	Weighted Average
3,832		48.73% Pervious Area
4,031		51.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4: EDA

Runoff = 0.77 cfs @ 12.10 hrs, Volume= 0.059 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
5,075	98	Paved roads w/curbs & sewers, HSG A
13,358	49	50-75% Grass cover, Fair, HSG A
303	76	Gravel roads, HSG A
18,736	63	Weighted Average
13,661		72.91% Pervious Area
5,075		27.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5: EDA

Runoff = 0.53 cfs @ 12.10 hrs, Volume= 0.038 af, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
4,562	49	50-75% Grass cover, Fair, HSG A
3,988	98	Paved roads w/curbs & sewers, HSG A
8,550	72	Weighted Average
4,562		53.36% Pervious Area
3,988		46.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP1: Wetland D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.490 ac, 51.17% Impervious, Inflow Depth = 2.52" for 10y24h event
Inflow = 1.42 cfs @ 12.09 hrs, Volume= 0.103 af
Outflow = 1.42 cfs @ 12.09 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Wetland C-B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.692 ac, 25.28% Impervious, Inflow Depth = 2.70" for 10y24h event
Inflow = 2.15 cfs @ 12.09 hrs, Volume= 0.156 af
Outflow = 2.15 cfs @ 12.09 hrs, Volume= 0.156 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Offsite

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.181 ac, 51.27% Impervious, Inflow Depth = 2.52" for 10y24h event
Inflow = 0.52 cfs @ 12.09 hrs, Volume= 0.038 af
Outflow = 0.52 cfs @ 12.09 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Wetland C

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.430 ac, 27.09% Impervious, Inflow Depth = 1.64" for 10y24h event
Inflow = 0.77 cfs @ 12.10 hrs, Volume= 0.059 af
Outflow = 0.77 cfs @ 12.10 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Int. Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.196 ac, 46.64% Impervious, Inflow Depth = 2.35" for 10y24h event
Inflow = 0.53 cfs @ 12.10 hrs, Volume= 0.038 af
Outflow = 0.53 cfs @ 12.10 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: EDA Runoff Area=21,363 sf 51.17% Impervious Runoff Depth=5.13"
Tc=6.0 min CN=74 Runoff=2.88 cfs 0.210 af

Subcatchment 2: EDA Runoff Area=30,134 sf 25.28% Impervious Runoff Depth=5.37"
Tc=6.0 min CN=76 Runoff=4.23 cfs 0.309 af

Subcatchment 3: EDA Runoff Area=7,863 sf 51.27% Impervious Runoff Depth=5.13"
Tc=6.0 min CN=74 Runoff=1.06 cfs 0.077 af

Subcatchment 4: EDA Runoff Area=18,736 sf 27.09% Impervious Runoff Depth=3.85"
Tc=6.0 min CN=63 Runoff=1.90 cfs 0.138 af

Subcatchment 5: EDA Runoff Area=8,550 sf 46.64% Impervious Runoff Depth=4.90"
Tc=6.0 min CN=72 Runoff=1.10 cfs 0.080 af

Reach DP1: Wetland D Inflow=2.88 cfs 0.210 af
Outflow=2.88 cfs 0.210 af

Reach DP2: Wetland C-B Inflow=4.23 cfs 0.309 af
Outflow=4.23 cfs 0.309 af

Reach DP3: Offsite Inflow=1.06 cfs 0.077 af
Outflow=1.06 cfs 0.077 af

Reach DP4: Wetland C Inflow=1.90 cfs 0.138 af
Outflow=1.90 cfs 0.138 af

Reach DP5: Int. Stream Inflow=1.10 cfs 0.080 af
Outflow=1.10 cfs 0.080 af

Total Runoff Area = 1.989 ac Runoff Volume = 0.814 af Average Runoff Depth = 4.91"
63.48% Pervious = 1.263 ac 36.52% Impervious = 0.726 ac

Summary for Subcatchment 1: EDA

Runoff = 2.88 cfs @ 12.09 hrs, Volume= 0.210 af, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
10,932	98	Paved roads w/curbs & sewers, HSG A
10,431	49	50-75% Grass cover, Fair, HSG A
21,363	74	Weighted Average
10,431		48.83% Pervious Area
10,932		51.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2: EDA

Runoff = 4.23 cfs @ 12.09 hrs, Volume= 0.309 af, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
7,618	98	Paved roads w/curbs & sewers, HSG B
22,515	69	50-75% Grass cover, Fair, HSG B
1	85	Gravel roads, HSG B
30,134	76	Weighted Average
22,516		74.72% Pervious Area
7,618		25.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3: EDA

Runoff = 1.06 cfs @ 12.09 hrs, Volume= 0.077 af, Depth= 5.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
4,031	98	Paved roads w/curbs & sewers, HSG A
3,832	49	50-75% Grass cover, Fair, HSG A
7,863	74	Weighted Average
3,832		48.73% Pervious Area
4,031		51.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4: EDA

Runoff = 1.90 cfs @ 12.09 hrs, Volume= 0.138 af, Depth= 3.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
5,075	98	Paved roads w/curbs & sewers, HSG A
13,358	49	50-75% Grass cover, Fair, HSG A
303	76	Gravel roads, HSG A
18,736	63	Weighted Average
13,661		72.91% Pervious Area
5,075		27.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5: EDA

Runoff = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af, Depth= 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
4,562	49	50-75% Grass cover, Fair, HSG A
3,988	98	Paved roads w/curbs & sewers, HSG A
8,550	72	Weighted Average
4,562		53.36% Pervious Area
3,988		46.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP1: Wetland D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.490 ac, 51.17% Impervious, Inflow Depth = 5.13" for 100y24h event
Inflow = 2.88 cfs @ 12.09 hrs, Volume= 0.210 af
Outflow = 2.88 cfs @ 12.09 hrs, Volume= 0.210 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Wetland C-B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.692 ac, 25.28% Impervious, Inflow Depth = 5.37" for 100y24h event
Inflow = 4.23 cfs @ 12.09 hrs, Volume= 0.309 af
Outflow = 4.23 cfs @ 12.09 hrs, Volume= 0.309 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Offsite

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.181 ac, 51.27% Impervious, Inflow Depth = 5.13" for 100y24h event
Inflow = 1.06 cfs @ 12.09 hrs, Volume= 0.077 af
Outflow = 1.06 cfs @ 12.09 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Wetland C

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.430 ac, 27.09% Impervious, Inflow Depth = 3.85" for 100y24h event
Inflow = 1.90 cfs @ 12.09 hrs, Volume= 0.138 af
Outflow = 1.90 cfs @ 12.09 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min

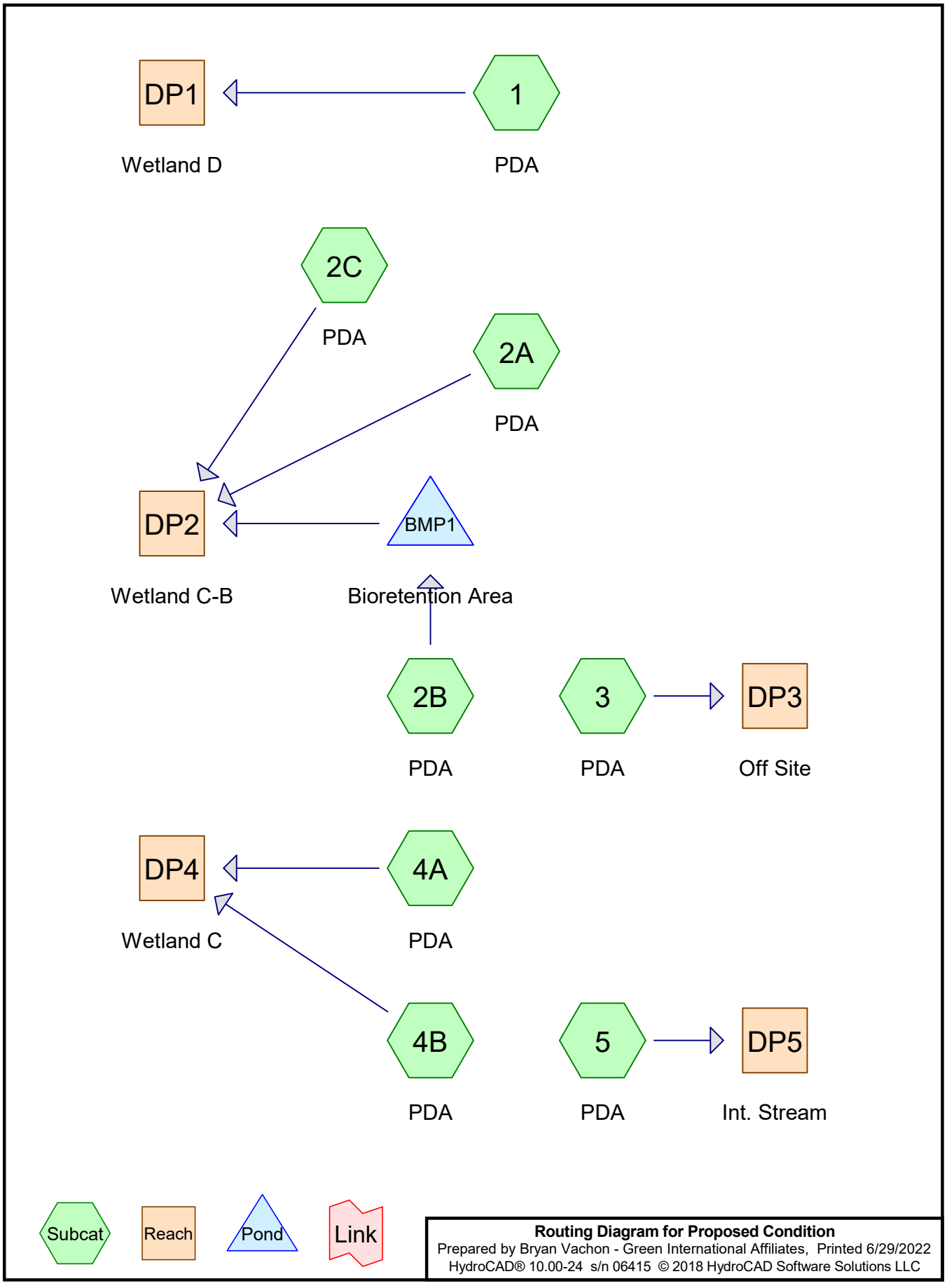
Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Int. Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.196 ac, 46.64% Impervious, Inflow Depth = 4.90" for 100y24h event
Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af
Outflow = 1.10 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs


DP1
1
Wetland D
PDA
2C
PDA
2A
PDA
DP2
BMP1
Wetland C-B
Bioretention Area
2B
PDA
3
PDA
DP3
Off Site
DP4
4A
Wetland C
PDA
4B
PDA
5
PDA
DP5
Int. Stream
Subcat
Reach
Pond
Link
Routing Diagram for Proposed Condition
Prepared by Bryan Vachon - Green International Affiliates, Printed 6/29/2022
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Proposed Condition

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.706	49	50-75% Grass cover, Fair, HSG A (1, 2A, 2B, 2C, 3, 4A, 5)
0.092	76	Gravel roads, HSG A (2B, 3, 4A)
1.190	98	Paved roads w/curbs & sewers, HSG A (1, 2A, 2B, 2C, 3, 4A, 4B, 5)
1.988	**80**	**TOTAL AREA**

Proposed Condition

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.988	HSG A	1, 2A, 2B, 2C, 3, 4A, 4B, 5
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.988		**TOTAL AREA**

Proposed Condition

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	BMP1	89.75	89.20	73.0	0.0075	0.013	12.0	0.0	0.0

Proposed Condition *Type III 24-hr 2y24h Rainfall=3.30"*
Prepared by Bryan Vachon - Green International Affiliates Printed 6/29/2022
HydroCAD® 10.00-24 s/n 06415 © 2018 HydroCAD Software Solutions LLC Page 5

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: PDA Runoff Area=16,337 sf 60.73% Impervious Runoff Depth=1.41"
Tc=6.0 min CN=79 Runoff=0.60 cfs 0.044 af

Subcatchment 2A: PDA Runoff Area=5,696 sf 4.04% Impervious Runoff Depth=0.17"
Tc=6.0 min CN=51 Runoff=0.01 cfs 0.002 af

Subcatchment 2B: PDA Runoff Area=24,307 sf 72.83% Impervious Runoff Depth=1.84"
Tc=6.0 min CN=85 Runoff=1.18 cfs 0.086 af

Subcatchment 2C: PDA Runoff Area=8,488 sf 70.55% Impervious Runoff Depth=1.77"
Tc=6.0 min CN=84 Runoff=0.40 cfs 0.029 af

Subcatchment 3: PDA Runoff Area=3,825 sf 4.44% Impervious Runoff Depth=0.31"
Tc=6.0 min CN=56 Runoff=0.01 cfs 0.002 af

Subcatchment 4A: PDA Runoff Area=7,581 sf 4.79% Impervious Runoff Depth=0.52"
Tc=6.0 min CN=62 Runoff=0.07 cfs 0.008 af

Subcatchment 4B: PDA Runoff Area=12,395 sf 100.00% Impervious Runoff Depth=3.07"
Tc=6.0 min CN=98 Runoff=0.89 cfs 0.073 af

Subcatchment 5: PDA Runoff Area=7,983 sf 63.59% Impervious Runoff Depth=1.48"
Tc=6.0 min CN=80 Runoff=0.31 cfs 0.023 af

Reach DP1: Wetland D Inflow=0.60 cfs 0.044 af
Outflow=0.60 cfs 0.044 af

Reach DP2: Wetland C-B Inflow=0.40 cfs 0.068 af
Outflow=0.40 cfs 0.068 af

Reach DP3: Off Site Inflow=0.01 cfs 0.002 af
Outflow=0.01 cfs 0.002 af

Reach DP4: Wetland C Inflow=0.96 cfs 0.080 af
Outflow=0.96 cfs 0.080 af

Reach DP5: Int. Stream Inflow=0.31 cfs 0.023 af
Outflow=0.31 cfs 0.023 af

Pond BMP1: Bioretention Area Peak Elev=93.03' Storage=2,162 cf Inflow=1.18 cfs 0.086 af
Outflow=0.14 cfs 0.037 af

Total Runoff Area = 1.988 ac Runoff Volume = 0.266 af Average Runoff Depth = 1.60"
40.14% Pervious = 0.798 ac 59.86% Impervious = 1.190 ac

Summary for Subcatchment 1: PDA

Runoff = 0.60 cfs @ 12.10 hrs, Volume= 0.044 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
9,921	98	Paved roads w/curbs & sewers, HSG A
6,416	49	50-75% Grass cover, Fair, HSG A
16,337	79	Weighted Average
6,416		39.27% Pervious Area
9,921		60.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2A: PDA

Runoff = 0.01 cfs @ 12.42 hrs, Volume= 0.002 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
230	98	Paved roads w/curbs & sewers, HSG A
5,466	49	50-75% Grass cover, Fair, HSG A
5,696	51	Weighted Average
5,466		95.96% Pervious Area
230		4.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2B: PDA

Runoff = 1.18 cfs @ 12.09 hrs, Volume= 0.086 af, Depth= 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
17,703	98	Paved roads w/curbs & sewers, HSG A
6,280	49	50-75% Grass cover, Fair, HSG A
324	76	Gravel roads, HSG A
24,307	85	Weighted Average
6,604		27.17% Pervious Area
17,703		72.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2C: PDA

Runoff = 0.40 cfs @ 12.09 hrs, Volume= 0.029 af, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
2,500	49	50-75% Grass cover, Fair, HSG A
5,988	98	Paved roads w/curbs & sewers, HSG A
8,488	84	Weighted Average
2,500		29.45% Pervious Area
5,988		70.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3: PDA

Runoff = 0.01 cfs @ 12.29 hrs, Volume= 0.002 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
170	98	Paved roads w/curbs & sewers, HSG A
3,008	49	50-75% Grass cover, Fair, HSG A
647	76	Gravel roads, HSG A
3,825	56	Weighted Average
3,655		95.56% Pervious Area
170		4.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4A: PDA

Runoff = 0.07 cfs @ 12.12 hrs, Volume= 0.008 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
363	98	Paved roads w/curbs & sewers, HSG A
4,187	49	50-75% Grass cover, Fair, HSG A
3,031	76	Gravel roads, HSG A
7,581	62	Weighted Average
7,218		95.21% Pervious Area
363		4.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4B: PDA

Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.073 af, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
12,395	98	Paved roads w/curbs & sewers, HSG A
12,395		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5: PDA

Runoff = 0.31 cfs @ 12.10 hrs, Volume= 0.023 af, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2y24h Rainfall=3.30"

Area (sf)	CN	Description
2,907	49	50-75% Grass cover, Fair, HSG A
5,076	98	Paved roads w/curbs & sewers, HSG A
7,983	80	Weighted Average
2,907		36.41% Pervious Area
5,076		63.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP1: Wetland D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.375 ac, 60.73% Impervious, Inflow Depth = 1.41" for 2y24h event
Inflow = 0.60 cfs @ 12.10 hrs, Volume= 0.044 af
Outflow = 0.60 cfs @ 12.10 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Wetland C-B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.884 ac, 62.15% Impervious, Inflow Depth = 0.92" for 2y24h event
Inflow = 0.40 cfs @ 12.09 hrs, Volume= 0.068 af
Outflow = 0.40 cfs @ 12.09 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Off Site

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.088 ac, 4.44% Impervious, Inflow Depth = 0.31" for 2y24h event
Inflow = 0.01 cfs @ 12.29 hrs, Volume= 0.002 af
Outflow = 0.01 cfs @ 12.29 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Wetland C

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.459 ac, 63.87% Impervious, Inflow Depth = 2.10" for 2y24h event
Inflow = 0.96 cfs @ 12.09 hrs, Volume= 0.080 af
Outflow = 0.96 cfs @ 12.09 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Int. Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.183 ac, 63.59% Impervious, Inflow Depth = 1.48" for 2y24h event
Inflow = 0.31 cfs @ 12.10 hrs, Volume= 0.023 af
Outflow = 0.31 cfs @ 12.10 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond BMP1: Bioretention Area

Inflow Area = 0.558 ac, 72.83% Impervious, Inflow Depth = 1.84" for 2y24h event
Inflow = 1.18 cfs @ 12.09 hrs, Volume= 0.086 af
Outflow = 0.14 cfs @ 12.86 hrs, Volume= 0.037 af, Atten= 88%, Lag= 46.2 min
Primary = 0.14 cfs @ 12.86 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 93.03' @ 12.86 hrs Surf.Area= 1,750 sf Storage= 2,162 cf

Plug-Flow detention time= 272.9 min calculated for 0.037 af (43% of inflow)
Center-of-Mass det. time= 152.0 min (976.8 - 824.7)

Volume	Invert	Avail.Storage	Storage Description
#1	90.50'	2,447 cf	**BIORET AREA (Irregular)** Listed below (Recalc) 4,418 cf Overall - 1,971 cf Embedded = 2,447 cf
#2	90.50'	591 cf	**Bio Soil (Irregular)** Listed below (Recalc) Inside #1 1,971 cf Overall x 30.0% Voids
		3,038 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.50	1,314	131.0	0	0	1,314
92.00	1,314	131.0	1,971	1,971	1,511
92.75	1,626	145.0	1,100	3,071	1,835
93.00	1,737	150.0	420	3,492	1,958
93.50	1,969	159.0	926	4,418	2,192

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.50	1,314	131.0	0	0	1,314
92.00	1,314	131.0	1,971	1,971	1,511

Device	Routing	Invert	Outlet Devices
#1	Primary	89.75'	**12.0" Round CMP_Round 12"** L= 73.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 89.75' / 89.20' S= 0.0075 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	93.00'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Primary OutFlow Max=0.13 cfs @ 12.86 hrs HW=93.03' (Free Discharge)
↑**1=CMP_Round 12"** (Passes 0.13 cfs of 5.44 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 0.13 cfs @ 0.56 fps)

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: PDA Runoff Area=16,337 sf 60.73% Impervious Runoff Depth=2.97"
Tc=6.0 min CN=79 Runoff=1.28 cfs 0.093 af

Subcatchment 2A: PDA Runoff Area=5,696 sf 4.04% Impervious Runoff Depth=0.83"
Tc=6.0 min CN=51 Runoff=0.09 cfs 0.009 af

Subcatchment 2B: PDA Runoff Area=24,307 sf 72.83% Impervious Runoff Depth=3.55"
Tc=6.0 min CN=85 Runoff=2.25 cfs 0.165 af

Subcatchment 2C: PDA Runoff Area=8,488 sf 70.55% Impervious Runoff Depth=3.45"
Tc=6.0 min CN=84 Runoff=0.77 cfs 0.056 af

Subcatchment 3: PDA Runoff Area=3,825 sf 4.44% Impervious Runoff Depth=1.15"
Tc=6.0 min CN=56 Runoff=0.10 cfs 0.008 af

Subcatchment 4A: PDA Runoff Area=7,581 sf 4.79% Impervious Runoff Depth=1.56"
Tc=6.0 min CN=62 Runoff=0.29 cfs 0.023 af

Subcatchment 4B: PDA Runoff Area=12,395 sf 100.00% Impervious Runoff Depth=4.96"
Tc=6.0 min CN=98 Runoff=1.41 cfs 0.118 af

Subcatchment 5: PDA Runoff Area=7,983 sf 63.59% Impervious Runoff Depth=3.07"
Tc=6.0 min CN=80 Runoff=0.65 cfs 0.047 af

Reach DP1: Wetland D Inflow=1.28 cfs 0.093 af
Outflow=1.28 cfs 0.093 af

Reach DP2: Wetland C-B Inflow=2.69 cfs 0.182 af
Outflow=2.69 cfs 0.182 af

Reach DP3: Off Site Inflow=0.10 cfs 0.008 af
Outflow=0.10 cfs 0.008 af

Reach DP4: Wetland C Inflow=1.70 cfs 0.140 af
Outflow=1.70 cfs 0.140 af

Reach DP5: Int. Stream Inflow=0.65 cfs 0.047 af
Outflow=0.65 cfs 0.047 af

Pond BMP1: Bioretention Area Peak Elev=93.18' Storage=2,434 cf Inflow=2.25 cfs 0.165 af
Outflow=1.95 cfs 0.117 af

Total Runoff Area = 1.988 ac Runoff Volume = 0.519 af Average Runoff Depth = 3.13"
40.14% Pervious = 0.798 ac 59.86% Impervious = 1.190 ac

Summary for Subcatchment 1: PDA

Runoff = 1.28 cfs @ 12.09 hrs, Volume= 0.093 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
9,921	98	Paved roads w/curbs & sewers, HSG A
6,416	49	50-75% Grass cover, Fair, HSG A
16,337	79	Weighted Average
6,416		39.27% Pervious Area
9,921		60.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2A: PDA

Runoff = 0.09 cfs @ 12.12 hrs, Volume= 0.009 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
230	98	Paved roads w/curbs & sewers, HSG A
5,466	49	50-75% Grass cover, Fair, HSG A
5,696	51	Weighted Average
5,466		95.96% Pervious Area
230		4.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2B: PDA

Runoff = 2.25 cfs @ 12.09 hrs, Volume= 0.165 af, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
17,703	98	Paved roads w/curbs & sewers, HSG A
6,280	49	50-75% Grass cover, Fair, HSG A
324	76	Gravel roads, HSG A
24,307	85	Weighted Average
6,604		27.17% Pervious Area
17,703		72.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2C: PDA

Runoff = 0.77 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
2,500	49	50-75% Grass cover, Fair, HSG A
5,988	98	Paved roads w/curbs & sewers, HSG A
8,488	84	Weighted Average
2,500		29.45% Pervious Area
5,988		70.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3: PDA

Runoff = 0.10 cfs @ 12.11 hrs, Volume= 0.008 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
170	98	Paved roads w/curbs & sewers, HSG A
3,008	49	50-75% Grass cover, Fair, HSG A
647	76	Gravel roads, HSG A
3,825	56	Weighted Average
3,655		95.56% Pervious Area
170		4.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4A: PDA

Runoff = 0.29 cfs @ 12.10 hrs, Volume= 0.023 af, Depth= 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
363	98	Paved roads w/curbs & sewers, HSG A
4,187	49	50-75% Grass cover, Fair, HSG A
3,031	76	Gravel roads, HSG A
7,581	62	Weighted Average
7,218		95.21% Pervious Area
363		4.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4B: PDA

Runoff = 1.41 cfs @ 12.09 hrs, Volume= 0.118 af, Depth= 4.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
12,395	98	Paved roads w/curbs & sewers, HSG A
12,395		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5: PDA

Runoff = 0.65 cfs @ 12.09 hrs, Volume= 0.047 af, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10y24h Rainfall=5.20"

Area (sf)	CN	Description
2,907	49	50-75% Grass cover, Fair, HSG A
5,076	98	Paved roads w/curbs & sewers, HSG A
7,983	80	Weighted Average
2,907		36.41% Pervious Area
5,076		63.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP1: Wetland D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.375 ac, 60.73% Impervious, Inflow Depth = 2.97" for 10y24h event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 0.093 af
Outflow = 1.28 cfs @ 12.09 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Wetland C-B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.884 ac, 62.15% Impervious, Inflow Depth = 2.47" for 10y24h event
Inflow = 2.69 cfs @ 12.13 hrs, Volume= 0.182 af
Outflow = 2.69 cfs @ 12.13 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Off Site

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.088 ac, 4.44% Impervious, Inflow Depth = 1.15" for 10y24h event
Inflow = 0.10 cfs @ 12.11 hrs, Volume= 0.008 af
Outflow = 0.10 cfs @ 12.11 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Wetland C

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.459 ac, 63.87% Impervious, Inflow Depth = 3.67" for 10y24h event
Inflow = 1.70 cfs @ 12.09 hrs, Volume= 0.140 af
Outflow = 1.70 cfs @ 12.09 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Int. Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.183 ac, 63.59% Impervious, Inflow Depth = 3.07" for 10y24h event
Inflow = 0.65 cfs @ 12.09 hrs, Volume= 0.047 af
Outflow = 0.65 cfs @ 12.09 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond BMP1: Bioretention Area

Inflow Area = 0.558 ac, 72.83% Impervious, Inflow Depth = 3.55" for 10y24h event
Inflow = 2.25 cfs @ 12.09 hrs, Volume= 0.165 af
Outflow = 1.95 cfs @ 12.14 hrs, Volume= 0.117 af, Atten= 13%, Lag= 3.3 min
Primary = 1.95 cfs @ 12.14 hrs, Volume= 0.117 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 93.18' @ 12.15 hrs Surf.Area= 1,819 sf Storage= 2,434 cf

Plug-Flow detention time= 154.3 min calculated for 0.117 af (71% of inflow)
Center-of-Mass det. time= 62.3 min (868.3 - 806.0)

Volume	Invert	Avail.Storage	Storage Description
#1	90.50'	2,447 cf	**BIORET AREA (Irregular)** Listed below (Recalc) 4,418 cf Overall - 1,971 cf Embedded = 2,447 cf
#2	90.50'	591 cf	**Bio Soil (Irregular)** Listed below (Recalc) Inside #1 1,971 cf Overall x 30.0% Voids
		3,038 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.50	1,314	131.0	0	0	1,314
92.00	1,314	131.0	1,971	1,971	1,511
92.75	1,626	145.0	1,100	3,071	1,835
93.00	1,737	150.0	420	3,492	1,958
93.50	1,969	159.0	926	4,418	2,192

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.50	1,314	131.0	0	0	1,314
92.00	1,314	131.0	1,971	1,971	1,511

Device	Routing	Invert	Outlet Devices
#1	Primary	89.75'	**12.0" Round CMP_Round 12"** L= 73.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 89.75' / 89.20' S= 0.0075 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	93.00'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Primary OutFlow Max=1.98 cfs @ 12.14 hrs HW=93.18' (Free Discharge)
↑**1=CMP_Round 12"** (Passes 1.98 cfs of 5.59 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 1.98 cfs @ 1.38 fps)

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: PDA Runoff Area=16,337 sf 60.73% Impervious Runoff Depth=5.72"
Tc=6.0 min CN=79 Runoff=2.43 cfs 0.179 af

Subcatchment 2A: PDA Runoff Area=5,696 sf 4.04% Impervious Runoff Depth=2.50"
Tc=6.0 min CN=51 Runoff=0.35 cfs 0.027 af

Subcatchment 2B: PDA Runoff Area=24,307 sf 72.83% Impervious Runoff Depth=6.44"
Tc=6.0 min CN=85 Runoff=3.96 cfs 0.299 af

Subcatchment 2C: PDA Runoff Area=8,488 sf 70.55% Impervious Runoff Depth=6.32"
Tc=6.0 min CN=84 Runoff=1.36 cfs 0.103 af

Subcatchment 3: PDA Runoff Area=3,825 sf 4.44% Impervious Runoff Depth=3.05"
Tc=6.0 min CN=56 Runoff=0.30 cfs 0.022 af

Subcatchment 4A: PDA Runoff Area=7,581 sf 4.79% Impervious Runoff Depth=3.74"
Tc=6.0 min CN=62 Runoff=0.74 cfs 0.054 af

Subcatchment 4B: PDA Runoff Area=12,395 sf 100.00% Impervious Runoff Depth=7.99"
Tc=6.0 min CN=98 Runoff=2.25 cfs 0.189 af

Subcatchment 5: PDA Runoff Area=7,983 sf 63.59% Impervious Runoff Depth=5.84"
Tc=6.0 min CN=80 Runoff=1.21 cfs 0.089 af

Reach DP1: Wetland D Inflow=2.43 cfs 0.179 af
Outflow=2.43 cfs 0.179 af

Reach DP2: Wetland C-B Inflow=4.67 cfs 0.381 af
Outflow=4.67 cfs 0.381 af

Reach DP3: Off Site Inflow=0.30 cfs 0.022 af
Outflow=0.30 cfs 0.022 af

Reach DP4: Wetland C Inflow=2.99 cfs 0.244 af
Outflow=2.99 cfs 0.244 af

Reach DP5: Int. Stream Inflow=1.21 cfs 0.089 af
Outflow=1.21 cfs 0.089 af

Pond BMP1: Bioretention Area Peak Elev=93.42' Storage=2,879 cf Inflow=3.96 cfs 0.299 af
Outflow=3.11 cfs 0.251 af

Total Runoff Area = 1.988 ac Runoff Volume = 0.963 af Average Runoff Depth = 5.81"
40.14% Pervious = 0.798 ac 59.86% Impervious = 1.190 ac

Summary for Subcatchment 1: PDA

Runoff = 2.43 cfs @ 12.09 hrs, Volume= 0.179 af, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
9,921	98	Paved roads w/curbs & sewers, HSG A
6,416	49	50-75% Grass cover, Fair, HSG A
16,337	79	Weighted Average
6,416		39.27% Pervious Area
9,921		60.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2A: PDA

Runoff = 0.35 cfs @ 12.10 hrs, Volume= 0.027 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
230	98	Paved roads w/curbs & sewers, HSG A
5,466	49	50-75% Grass cover, Fair, HSG A
5,696	51	Weighted Average
5,466		95.96% Pervious Area
230		4.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2B: PDA

Runoff = 3.96 cfs @ 12.09 hrs, Volume= 0.299 af, Depth= 6.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
17,703	98	Paved roads w/curbs & sewers, HSG A
6,280	49	50-75% Grass cover, Fair, HSG A
324	76	Gravel roads, HSG A
24,307	85	Weighted Average
6,604		27.17% Pervious Area
17,703		72.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 2C: PDA

Runoff = 1.36 cfs @ 12.09 hrs, Volume= 0.103 af, Depth= 6.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
2,500	49	50-75% Grass cover, Fair, HSG A
5,988	98	Paved roads w/curbs & sewers, HSG A
8,488	84	Weighted Average
2,500		29.45% Pervious Area
5,988		70.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 3: PDA

Runoff = 0.30 cfs @ 12.10 hrs, Volume= 0.022 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
170	98	Paved roads w/curbs & sewers, HSG A
3,008	49	50-75% Grass cover, Fair, HSG A
647	76	Gravel roads, HSG A
3,825	56	Weighted Average
3,655		95.56% Pervious Area
170		4.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4A: PDA

Runoff = 0.74 cfs @ 12.10 hrs, Volume= 0.054 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
363	98	Paved roads w/curbs & sewers, HSG A
4,187	49	50-75% Grass cover, Fair, HSG A
3,031	76	Gravel roads, HSG A
7,581	62	Weighted Average
7,218		95.21% Pervious Area
363		4.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 4B: PDA

Runoff = 2.25 cfs @ 12.09 hrs, Volume= 0.189 af, Depth= 7.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
12,395	98	Paved roads w/curbs & sewers, HSG A
12,395		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment 5: PDA

Runoff = 1.21 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 5.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100y24h Rainfall=8.23"

Area (sf)	CN	Description
2,907	49	50-75% Grass cover, Fair, HSG A
5,076	98	Paved roads w/curbs & sewers, HSG A
7,983	80	Weighted Average
2,907		36.41% Pervious Area
5,076		63.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Reach DP1: Wetland D

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.375 ac, 60.73% Impervious, Inflow Depth = 5.72" for 100y24h event
Inflow = 2.43 cfs @ 12.09 hrs, Volume= 0.179 af
Outflow = 2.43 cfs @ 12.09 hrs, Volume= 0.179 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Wetland C-B

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.884 ac, 62.15% Impervious, Inflow Depth = 5.17" for 100y24h event
Inflow = 4.67 cfs @ 12.12 hrs, Volume= 0.381 af
Outflow = 4.67 cfs @ 12.12 hrs, Volume= 0.381 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Off Site

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.088 ac, 4.44% Impervious, Inflow Depth = 3.05" for 100y24h event
Inflow = 0.30 cfs @ 12.10 hrs, Volume= 0.022 af
Outflow = 0.30 cfs @ 12.10 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Wetland C

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.459 ac, 63.87% Impervious, Inflow Depth = 6.38" for 100y24h event
Inflow = 2.99 cfs @ 12.09 hrs, Volume= 0.244 af
Outflow = 2.99 cfs @ 12.09 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Int. Stream

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.183 ac, 63.59% Impervious, Inflow Depth = 5.84" for 100y24h event
Inflow = 1.21 cfs @ 12.09 hrs, Volume= 0.089 af
Outflow = 1.21 cfs @ 12.09 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond BMP1: Bioretention Area

Inflow Area = 0.558 ac, 72.83% Impervious, Inflow Depth = 6.44" for 100y24h event
Inflow = 3.96 cfs @ 12.09 hrs, Volume= 0.299 af
Outflow = 3.11 cfs @ 12.16 hrs, Volume= 0.251 af, Atten= 21%, Lag= 4.0 min
Primary = 3.11 cfs @ 12.16 hrs, Volume= 0.251 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 93.42' @ 12.16 hrs Surf.Area= 1,930 sf Storage= 2,879 cf

Plug-Flow detention time= 110.4 min calculated for 0.251 af (84% of inflow)
Center-of-Mass det. time= 43.7 min (833.2 - 789.5)

Volume	Invert	Avail.Storage	Storage Description
#1	90.50'	2,447 cf	**BIORET AREA (Irregular)** Listed below (Recalc) 4,418 cf Overall - 1,971 cf Embedded = 2,447 cf
#2	90.50'	591 cf	**Bio Soil (Irregular)** Listed below (Recalc) Inside #1 1,971 cf Overall x 30.0% Voids
		3,038 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.50	1,314	131.0	0	0	1,314
92.00	1,314	131.0	1,971	1,971	1,511
92.75	1,626	145.0	1,100	3,071	1,835
93.00	1,737	150.0	420	3,492	1,958
93.50	1,969	159.0	926	4,418	2,192

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.50	1,314	131.0	0	0	1,314
92.00	1,314	131.0	1,971	1,971	1,511

Device	Routing	Invert	Outlet Devices
#1	Primary	89.75'	**12.0" Round CMP_Round 12"** L= 73.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 89.75' / 89.20' S= 0.0075 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#2	Device 1	93.00'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads

Primary OutFlow Max=3.10 cfs @ 12.16 hrs HW=93.41' (Free Discharge)
↑**1=CMP_Round 12"** (Passes 3.10 cfs of 5.80 cfs potential flow)
↑**2=Orifice/Grate** (Orifice Controls 3.10 cfs @ 3.10 fps)

Appendix F: O&M Plan and LTPPP

- Stormwater Management System Operation and Maintenance (O&M) Plan
- Long-Term Pollution Prevention Plan (LTPPP)
- Illicit Discharge Compliance Statement (IDCS)

Replacement of Bridge No. W-38-003 (2NV) Butters Row over MBTA

Stormwater Management System

Wilmington, MA

Operation and Maintenance Plan
and
Long-Term Pollution Prevention Plan

June 2022

Replacement of Bridge No. W-38-003 (2NV) Butters Row over MBTA
Stormwater Management System Operation and Maintenance (O&M) Plan

This Stormwater Management System Operation and Maintenance (O&M) Plan provides for the inspection and maintenance of catch basins and structural Stormwater Control Measures (SCMs) and for measures to prevent pollution associated with the Replacement of Bridge No. W-38-003 (2NV) Butters Row over MBTA and roadway improvements in Wilmington, MA.

This document has been prepared per the requirements of Massachusetts Department of Environmental Protection (MassDEP) Regulations 310 CMR 10.05 (6)(k)(9) for the O&M Plan. This O&M Plan satisfies the requirements of Massachusetts Stormwater Standard 9.

Responsible Party

In accordance with Massachusetts Department of Transportation (MassDOT) standards, the MassDOT District 4 office located in Arlington, MA, is responsible for the maintenance of all stormwater management features on roads within the project area.

MassDOT will be responsible for the maintenance of the proposed bioretention basin and closed drainage system.

Questions or concerns regarding activities associated with the O&M Plan should be addressed to MassDOT's District 4 office located at 519 Appleton Street, Arlington, MA 02476, phone (857) 368-4000, Fax (781) 646-5115 during regular weekday hours, or to MassDOT's Highway Command Center (HCC) located in South Boston, MA at (800) 227-0608 during all other times and days, including weekends and holidays.

Maintenance Measures and Record-Keeping

See Figure 7 of the Stormwater Management Report for the proposed stormwater system within the project limits. The stormwater management system covered by this O&M Plan consists of the following components:

- *Deep Sump Catch Basins with Hoods*
- *1 Bioretention Basin*

MassDOT is working toward a performance-based maintenance program for SCMs and catch basins. For SCMs, MassDOT's overall approach will be to inspect SCMs, and based on the results of the inspections, perform inspections and maintenance to maintain functionality. For catch basins, MassDOT's overall approach will be to perform maintenance at an interval that maintains the functionality of the catch basin (e.g. sump

less than 50% full). Catch basin inspections, including documentation of sediment accumulation, and maintenance will generally occur simultaneously. Until MassDOT's maintenance program is fully developed, MassDOT inspects 15% of SCMs and 10% of catch basins annually and performs maintenance as needed.

MassDOT's maintenance program is data driven. Inspection and maintenance will be recorded by MassDOT personnel using hand-held tablets in the field to document sediment accumulation and other maintenance issues. Data will be recorded in MassDOT's asset management system which is accessible in the field or the office. The data will support the determination of optimal maintenance frequency for each asset.

Inspection and maintenance records will be made available through the asset management system through request with the MassDOT District 4 Environmental Engineer. Records will be kept for at least three years. Representatives of the Wilmington Conservation Commission, MassDEP, and US EPA may obtain access to these records during normal business hours, upon request.

Data to be collected during inspections includes the following:

For catch basins:

- Action performed (none, inspection, inspection and repair, inspection and cleaning)
- Overall condition
- Condition of grate opening (clogged or not)
- Level of sediment accumulation
- Follow-up action (none, rebuild, frame and grate replacement, structure cleaning, piping cleaning, other)

For SCMs:

- Overall condition
- Level of erosion
- Vegetative health
- Level of sediment accumulation
- Level of trash accumulation
- SCM accessibility
- Presence of standing water
- Emergency spillway condition
- Presence of woody vegetation
- Maintenance action needed

Maintenance actions will not occur at any set frequency, but rather will be based on condition and impact to functionality. Based on the results of the inspection, repairs will be made in accordance with MassDOT standard practices. Maintenance will be prioritized given the urgency of the required maintenance and availability of staff, contracts, etc. Maintenance may require contracting if existing contracts are unavailable to perform the work. More intensive remedial activities may require permitting and/or an engineering solution.

Erosion and Sediment Control Measures during Maintenance Activities

For maintenance activities that could result in discharges of sediments or other contaminants into wetlands, waterways, or other resource areas regulated under 310 CMR 10.00, the responsible maintenance personnel will employ measures to prevent migration of these sediments/contaminants. Such temporary measures may include, but are not necessarily limited to, the use of siltation barriers, catch basin covers, pipe plugs, cofferdams deployed within the stormwater structure, turbidity curtains, or other practices designed to prevent such discharges.

Where maintenance occurs in areas that are confined, with a low risk of discharge to adjacent water bodies, no special measures may be needed. Examples include, but are not limited to: (1) cleaning of a forebay under dry conditions when the work can be completed and exposed surfaces stabilized prior to placing it back into service; and (2) catch basin cleaning where the activity is limited to removing material from a sump below the elevation of the outlet pipe.

Access for Environmental Agency Inspection

Representatives of the MassDEP and US EPA may obtain access to observe and inspect roadway and associated stormwater management system components upon request to the District 4 Environmental Engineer. For non-emergency access, representatives of the agency should contact the District 4 Environmental Engineer at least 48 hours prior to the visit, to allow adequate safety protection to be provided during the visit. Representatives of the Lexington Conservation Commission also may obtain access to inspect the site upon request.

Under emergency conditions, agency representatives should contact the 24-Hour Transportation Operation Center at 800-227-0608.

Replacement of Bridge No. W-38-003 (2NV) Butters Row over MBTA

Long-Term Pollution Prevention Plan

In general, long-term pollution prevention and related maintenance activities will be conducted consistent with MassDOT Highway Division's National Pollutant Discharge Elimination System (NPDES) Transportation Separate Storm Sewer System (TS4) Permit and the measures outlined in MassDOT's Stormwater Management Plan (SWMP).

This LTPPP satisfies the requirements related to pollution prevention under Massachusetts Stormwater Standards 4, 5, 6, and 10.

Practices for Long-Term Pollution Prevention

For the facilities covered, long-term pollution prevention includes the following measures:

Litter Pick-up

MassDOT will conduct litter pick-up from the stormwater management facilities in conjunction with routine road maintenance activities.

Routine Inspection and Maintenance of SCMs

MassDOT will conduct inspection and maintenance of the stormwater control measures in accordance with the Project's O&M plan.

Maintenance of Landscaped Areas

Routine mowing will be conducted according to standard MassDOT practices. Embankments designed to impound water should be mowed as required to prevent establishment of woody vegetation.

Except in rare circumstances, MassDOT does not use fertilizers, herbicides, and pesticides for the maintenance of facilities. Exceptions include using fertilizer to ensure the survival of new plantings and herbicides to control invasive plants. Use of fertilizers and herbicides shall be reviewed and approved by the applicable MassDOT District Environmental Engineer and Landscape Division prior to application. Local Conservation Commission review may also be required.

Snow and Ice Management

Snow and Ice Management will be conducted consistent with the practices outlined in the MassDOT Snow and Ice Control Program Environmental Status and Planning Report

(ESPR), formerly known as the Snow and Ice Control Generic Environmental Impact Report (GEIR).

In accordance with the Snow and Ice Control ESPR, no sand is used on MassDOT properties for snow and ice control. The exception to this rule is within reduced salt areas where high sodium levels have been found in drinking water sources.

Street Sweeping

Routine highway cleaning, with a brush-type street sweeper, will be conducted in accordance with standard MassDOT practices. Sweeping will occur annually in the Spring.

Prohibition of Illicit Discharges

The MassDEP Stormwater Management Standards prohibit illicit discharges to the stormwater management system. Illicit discharges are discharges that do not consist entirely of stormwater, except for certain specified non-stormwater discharges.

Examples of discharges from the following sources are not considered illicit discharges:

- Firefighting activities*
- Foundation drains
- Water line flushing
- Footing drains
- Landscape irrigation
- Residential car washing
- Uncontaminated groundwater
- Rising groundwater
- Riparian habitats/wetlands
- Potable water sources
- Dechlorinated swimming pool water
- Street sweeping
- Wash water from buildings (without detergents)
- Condensation from air conditioning units
- Run-on from private driveways caused by precipitation
- Lawn watering

*Water from firefighting activities is allowed under this permit and need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

There are no known or proposed illicit connections associated with the Replacement of Bridge No. W-38-003 (2NV) Butters Row over MBTA and roadway improvements. Should an illicit discharge (e.g., evidence of contamination of surface water discharge by non-stormwater sources) be detected, MassDOT's District 4 Maintenance Engineer and/or Environmental Engineer will be notified to assist in determining the nature and source of the discharge for the purpose of eliminating the illicit discharge.

Invasive Species Management

If the stormwater facility inspector observes the presence of invasive species within the stormwater control measure, the inspector will notify the District Environmental Engineer, who will coordinate with the District 4 maintenance personnel and if

applicable, the Landscape Division, to initiate corrective action. Control of invasive plants will be conducted in accordance with MassDOT standard specifications for this practice and will be in compliance with all state and federal regulatory requirements for such practices.

Spill Prevention and Response

This project does not discharge to a Zone I, Zone A, or Outstanding Resource Water (ORW). The project is located within Zone II surface water supply protection area.

Response procedures will be implemented at the proposed bioretention basin for any significant release of hazardous materials such as fuels, oils, or chemical materials that have the potential of discharging to Zone II.

Reportable quantities will immediately be reported to the applicable Federal, State, and local agencies as required by law. Reportable quantities of chemical, fuels, or oils are established under the Clean Water Act and enforced through MassDEP. The MassDEP Emergency Response Program shall be immediately notified in accordance with required procedures for the report of a release (telephone 888-304-1133).

In the case of a spill, applicable containment and clean-up procedures will be performed immediately. The Wilmington Fire Department will be the first responders. MassDOT will provide the Wilmington Fire Department with a plan delineating the drainage system discharging to Zone II. MassDOT will be on-site to aid with traffic control and to provide clean-up supplies as necessary. Spill material collected during the response will be promptly removed and disposed of in accordance with Federal, State, and local requirements. If necessary, a licensed emergency response contractor will assist in cleanup of releases depending on the amount of the release and the ability of the responsible party to perform the required response.

Illicit Discharge Compliance Statement

Per Standard 10 of the Massachusetts Stormwater Handbook, the following is an Illicit Discharge Compliance Statement:

The design plans submitted for the Water Quality Certificate have been designed in full compliance with current MA Stormwater standards.

The Long-Term Pollution Prevention Plan is part of the Operation and Maintenance Plan and includes measures to prevent illicit discharges. There are no known combined sewer outfalls and to the best of our knowledge all closed stormwater systems discharge per Massachusetts DEP requirements. Based on observations during a site visit in October 2020 the site does not contain any known existing illicit discharges.

Registered Professional Engineer Block and Signature

6/28/2022

Signature and Date

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION

WILMINGTON
BUTTERS ROW OVER MBTA

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	105
PROJECT FILE NO.	608929		

TITLE SHEET & INDEX

PLAN AND PROFILE OF

BUTTERS ROW OVER MBTA

(BRIDGE NO. W-38-003 (C99))

IN THE TOWN OF

WILMINGTON

MIDDLESEX COUNTY

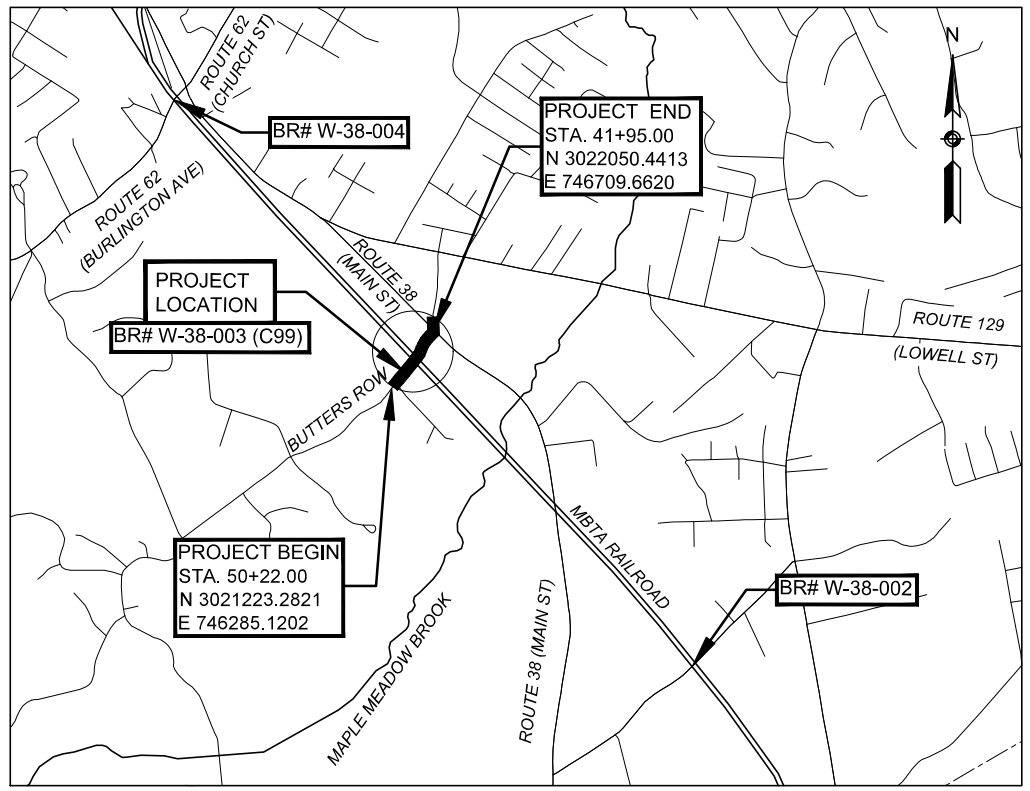
FEDERAL AID PROJECT NO. -

100% SUBMITTAL

THESE PLANS ARE SUPPLEMENTED BY THE OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE 2015 OVERHEAD SIGNAL STRUCTURE AND FOUNDATION STANDARD DRAWINGS, MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING, AND THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK.

WQC/ACOE PLAN SET DATE:
03/14/2023

INDEX



0 1000 2000 3000 4000

SCALE: 1" = 2000'

LENGTH OF PROJECT = 947.83 FEET = 0.180 MILES

DESIGN DESIGNATION (BUTTERS ROW)

DESIGN SPEED	25 MPH
ADT (2021)	3,472
ADT (2041)	4,236
K	15.5%
D	53%
T (PEAK HOUR)	4.0%
T (AVERAGE DAY)	6.4%
DHV	657
DDHV	350
FUNCTIONAL CLASSIFICATION	URBAN COLLECTOR

DATE: DECEMBER 16, 2022

12/16/2022	100% SUBMISSION	0
6/30/2022	75% SUBMISSION	0
2/25/2021	25% SUBMISSION	0
DATE	DESCRIPTION	REV #

massDOT Massachusetts Department of Transportation Highway Division

APPROVED

CHIEF ENGINEER _____ DATE _____

WQC/ACOE PLANS SHEET 1 OF 23

GREEN INTERNATIONAL AFFILIATES, INC.
TRANSPORTATION | STRUCTURAL | WATER RESOURCES | CIVIL/SITE

GENERAL SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
JB	JB	JERSEY BARRIER
CB	CB	CATCH BASIN
		CATCH BASIN CURB INLET
FP	FP	FLAG POLE
GP	GP	GAS PUMP
MB	MB	MAIL BOX
		POST SQUARE
		POST CIRCULAR
WELL	WELL	WELL
EHH	EHH	ELECTRIC HANDHOLE
		FENCE GATE POST
GG	GG	GAS GATE
BHL #	BHL #	BORING HOLE
MW #	MW #	MONITORING WELL
TP #	TP #	TEST PIT
		HYDRANT
		LIGHT POLE
CO.BD.		COUNTY BOUND
		GPS POINT
Ⓒ	Ⓒ	CABLE MANHOLE
Ⓓ	Ⓓ	DRAINAGE MANHOLE
Ⓔ	Ⓔ	ELECTRIC MANHOLE
Ⓖ	Ⓖ	GAS MANHOLE
Ⓜ	Ⓜ	MISC MANHOLE
Ⓢ	Ⓢ	SEWER MANHOLE
Ⓣ	Ⓣ	TELEPHONE MANHOLE
Ⓦ	Ⓦ	WATER MANHOLE
MHB	MHB	MASSACHUSETTS HIGHWAY BOUND
MON		MONUMENT
SB		STONE BOUND
TB		TOWN OR CITY BOUND
		TRAVERSE OR TRIANGULATION STATION
TPL or GUY	TPL or GUY	TROLLEY POLE OR GUY POLE
HTP		TRANSMISSION POLE
UFB	UFB	UTILITY POLE W/ FIREBOX
UPDL	UPDL	UTILITY POLE WITH DOUBLE LIGHT
ULT	ULT	UTILITY POLE W / 1 LIGHT
UPL	UPL	UTILITY POLE
		BUSH
SIZE & TYPE		TREE
		STUMP
		SWAMP / MARSH
WG	WG	WATER GATE
PM	PM	PARKING METER
		OVERHEAD CABLE/WIRE
		CURBING
100 99		CONTOURS (ON-THE-GROUND SURVEY DATA)
100 99		CONTOURS (PHOTOGRAMMETRIC DATA)
		UNDERGROUND DRAIN PIPE (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND ELECTRIC DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND GAS MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND SEWER MAIN (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND TELEPHONE DUCT (DOUBLE LINE 24 INCH AND OVER)
		UNDERGROUND WATER MAIN (DOUBLE LINE 24 INCH AND OVER)
		BALANCED STONE WALL
		GUARD RAIL - STEEL POSTS
		GUARD RAIL - WOOD POSTS
		GUARD RAIL - DOUBLE FACE - STEEL POSTS
		GUARD RAIL - DOUBLE FACE - WOOD POSTS
x	x	CHAIN LINK OR METAL FENCE
		WOOD FENCE
		HAY BALES/SILT FENCE
		TREE LINE
		SAWCUT LINE
		TOP OR BOTTOM OF SLOPE
		LIMIT OF EDGE OF PAVEMENT OR COLD PLANE AND OVERLAY
		BANK OF RIVER OR STREAM
		BORDER OF WETLAND
		100 FT WETLAND BUFFER
		200 FT RIVERFRONT BUFFER
		STATE HIGHWAY LAYOUT
		TOWN OR CITY LAYOUT
		COUNTY LAYOUT
		RAILROAD SIDELINE
		TOWN OR CITY BOUNDARY LINE
		PROPERTY LINE OR APPROXIMATE PROPERTY LINE
		EASEMENT
		SEDIMENT CONTROL BARRIER
		COIR LOG

TRAFFIC SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
1	1	CONTROLLER PHASE ACTUATED
		TRAFFIC SIGNAL HEAD (SIZE AS NOTED)
		WIRE LOOP DETECTOR (6' x 6' TYP UNLESS OTHERWISE SPECIFIED)
		VIDEO DETECTION CAMERA
		MICROWAVE DETECTOR
		PEDESTRIAN PUSH BUTTON, SIGN (DIRECTIONAL ARROW AS SHOWN) AND SADDLE
	*	EMERGENCY PREEMPTION CONFIRMATION STROBE LIGHT
		VEHICULAR SIGNAL HEAD
		VEHICULAR SIGNAL HEAD, OPTICALLY PROGRAMMED
		FLASHING BEACON
		PEDESTRIAN SIGNAL HEAD, (TYPE AS NOTED OR AS SPECIFIED)
RRSG	RRSG	RAILROAD SIGNAL
OR		SIGNAL POST AND BASE (ALPHA-NUMERIC DESIGNATION NOTED)
	20'	MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED)
		HIGH MAST POLE OR TOWER
		SIGN AND POST
		SIGN AND POST (2 POSTS)
	20'	MAST ARM WITH LUMINAIRE
		OPTICAL PRE-EMPTION DETECTOR
		CONTROL CABINET, GROUND MOUNTED
		CONTROL CABINET, POLE MOUNTED
		FLASHING BEACON CONTROL AND METER PEDESTAL
		LOAD CENTER ASSEMBLY
		PULL BOX 12"x12" (OR AS NOTED)
		ELECTRIC HANDHOLE 12"x24" (OR AS NOTED)
		TRAFFIC SIGNAL CONDUIT

PAVEMENT MARKINGS SYMBOLS

EXISTING	PROPOSED	DESCRIPTION
		PAVEMENT ARROW - WHITE
ONLY	ONLY	LEGEND "ONLY" - WHITE
	SL	STOP LINE
	CW	CROSSWALK
	SWL	SOLID WHITE LINE
	SYL	SOLID YELLOW LINE
	BWL	BROKEN WHITE LINE
	BYL	BROKEN YELLOW LINE
	DWL	DOTTED WHITE LINE
	DYL	DOTTED YELLOW LINE
	DWLEx	DOTTED WHITE LINE EXTENSION
	DYLEx	DOTTED YELLOW LINE EXTENSION
	DBWL	DOUBLE WHITE LINE
	DBYL	DOUBLE YELLOW LINE

ABBREVIATIONS

GENERAL

AADT	ANNUAL AVERAGE DAILY TRAFFIC
ABAN	ABANDON
ADJ	ADJUST
APPROX.	APPROXIMATE
A.C.	ASPHALT CONCRETE
ACCM PIPE	ASPHALT COATED CORRUGATED METAL PIPE
BIT.	BITUMINOUS
BC	BOTTOM OF CURB
BD.	BOUND
BL	BASELINE
BLDG	BUILDING
BM	BENCHMARK
BO	BY OTHERS
BOS	BOTTOM OF SLOPE
BR.	BRIDGE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CC	CEMENT CONCRETE
CCM	CEMENT CONCRETE MASONRY
CEM	CEMENT
CI	CURB INLET
CIP	CAST IRON PIPE
CLF	CHAIN LINK FENCE
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CSP	CORRUGATED STEEL PIPE
CO.	COUNTY
CONC	CONCRETE
CONT	CONTINUOUS
CONST	CONSTRUCTION
CR GR	CROWN GRADE
CTLO	COUNTY LAYOUT
DHV	DESIGN HOURLY VOLUME
DI	DROP INLET
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DW	STEADY DON'T WALK - PORTLAND ORANGE
DWY	DRIVEWAY
ELEV (or EL.)	ELEVATION
EMB	EMBANKMENT
EOP	EDGE OF PAVEMENT
ESMT	EASEMENT
EXIST (or EX)	EXISTING
EXC	EXCAVATION
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FDN.	FOUNDATION
FLDSTN	FIELDSTONE
GAR	GARAGE
GD	GROUND
GG	GAS GATE
GI	GUTTER INLET
GIP	GALVANIZED IRON PIPE
GRAN	GRANITE
GRAV	GRAVEL
GRD	GUARD
GRL	GUARDRAIL
HDW	HEADWALL
HMA	HOT MIX ASPHALT
HOR	HORIZONTAL
HYD	HYDRANT
INV	INVERT
JCT	JUNCTION
L	LENGTH OF CURVE
LB	LEACH BASIN
LP	LIGHT POLE
LT	LEFT
MAX	MAXIMUM
MB	MAILBOX
MH	MANHOLE
MHB	MASSACHUSETTS HIGHWAY BOUND
MIN	MINIMUM
NIC	NOT IN CONTRACT
NO.	NUMBER
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCR	PEDESTRIAN CURB RAMP
P.G.L.	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
POC	POINT ON CURVE
POT	POINT ON TANGENT
PRC	POINT OF REVERSE CURVATURE
PROJ	PROJECT
PROP	PROPOSED
PSB	PLANTABLE SOIL BORROW
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION

WILMINGTON
BUTTERS ROW OVER MBTA

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	105
PROJECT FILE NO.	608929		

LEGEND & ABBREVIATIONS

ABBREVIATIONS (cont.)

GENERAL

PVT	POINT OF VERTICAL TANGENCY
PVMT	PAVEMENT
PWW	PAVED WATER WAY
R	RADIUS OF CURVATURE
R&D	REMOVE AND DISPOSE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REM	REMOVE
RET	RETAIN
RET WALL	RETAINING WALL
ROW	RIGHT OF WAY
RR	RAILROAD
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
RT	RIGHT
SB	STONE BOUND
SGE	SLOPED GRANITE EDGING
SHLD	SHOULDER
SMH	SEWER MANHOLE
ST	STREET
STA	STATION
SSD	STOPPING SIGHT DISTANCE
SHLO	STATE HIGHWAY LAYOUT LINE
SW	SIDEWALK
T	TANGENT DISTANCE OF CURVE/TRUCK %
TAN	TANGENT
TEMP	TEMPORARY
TC	TOP OF CURB
TNLO	TOWN LAYOUT
TOS	TOP OF SLOPE
TYP	TYPICAL
UP	UTILITY POLE
VAR	VARIES
VERT	VERTICAL
VC	VERTICAL CURVE
VGC	VERTICAL GRANITE CURB
WG	WATER GATE
WIP	WROUGHT IRON PIPE
WM	WATER METER/WATER MAIN
X-SECT	CROSS SECTION

TRAFFIC SIGNAL ABBREVIATIONS

CAB	CABINET
CCVE	CLOSED CIRCUIT VIDEO EQUIPMENT
DW	STEADY UPRAISED HAND
FDW	FLASHING UPRAISED HAND
FR	FLASHING CIRCULAR RED
FRL	FLASHING RED LEFT ARROW
FRR	FLASHING RED RIGHT ARROW
FY	FLASHING CIRCULAR YELLOW
FYL	FLASHING YELLOW LEFT ARROW
FYR	FLASHING YELLOW RIGHT ARROW
G	STEADY CIRCULAR GREEN
GL	STEADY GREEN LEFT ARROW
GR	STEADY GREEN RIGHT ARROW
GSL	STEADY GREEN SLASH LEFT ARROW
GSR	STEADY GREEN SLASH RIGHT ARROW
GV	STEADY GREEN VERTICAL ARROW
OL	OVERLAP
PED	PEDESTRIAN
PTZ	PAN, TILT, ZOOM
R	STEADY CIRCULAR RED
RL	STEADY RED LEFT ARROW
RR	STEADY RED RIGHT ARROW
TR SIG	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
W	STEADY WALKING PERSON
Y	STEADY CIRCULAR YELLOW
YL	STEADY YELLOW LEFT ARROW

SURVEY NOTES

1. THE EXISTING CONDITIONS SHOWN ON THIS BASE MAP ARE THE RESULT OF AN ON-THE- GROUND INSTRUMENT SURVEY PERFORMED BETWEEN JULY 9, 2018 AND NOVEMBER 6, 2018 BY GREEN INTERNATIONAL AFFILIATES, INC. (GREEN) RECORDED ON MASSDOT FIELD BOOK 44243.

2. HORIZONTAL AND VERTICAL CONTROL WAS ESTABLISHED BY GREEN ON OCTOBER 28, 2016 WITH STATIC GPS VECTORS CALCULATED BY NATIONAL GEODETIC SURVEY'S OPUS SERVICE, IN MASSDOT DISTRICT 4 FIELD BOOK 41142, PAGE 84. HORIZONTAL DATUM IS BASED ON THE MASSACHUSETTS STATE PLANE COORDINATE SYSTEM, NAD83 (2011) EPOCH 2010.0000, VERTICAL DATUM IS NAVD 88 (COMPUTED USING GEOID12B) USING THE FOLLOWING CONTROL POINTS:

POINT	GRID NORTHING	GRID EASTING	ELEVATION	COMBINED GROUND TO GRID SCALE FACTOR
2-MDHL	3024249.8723	744113.8185	108.896	0.99998182
28-MMAG	3014918.9153	748357.2529	91.352	0.99998006

THE UNIT OF MEASUREMENTS IS US FEET. THE PROJECT COMBINED SCALE FACTOR IS 0.99998094.

3. THE RIGHT OF WAY LINES OF BUTTERS ROW SHOWN ARE THE DIRECT RESULT OF AN INSTRUMENT SURVEY PERFORMED ON-THE-GROUND BY GREEN INTERNATIONAL AFFILIATES, INC. WITH AN ERROR OF CLOSURE OF 1 IN 50281, AND FROM PLANS AND DEEDS OF RECORD. PRIVATE PROPERTY LINES HAVE NOT BEEN SURVEYED, THEY ARE COMPILED FROM DEEDS, RECORD PLAN & GIS INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE.

UTILITY NOTES:

1. ALL UNDERGROUND UTILITIES AS SHOWN WERE COMPILED USING FIELD SURVEY INFORMATION AND AVAILABLE RECORD INFORMATION. THE LOCATION OF EXISTING PIPES OR OTHER UNDERGROUND STRUCTURES OR PROPERTY LINES ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL UNDERGROUND PIPES OR STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL CALL "DIG SAFE" (1-888-344-7233) 72 HOURS (EXCLUDING SATURDAYS, SUNDAYS AND HOLIDAYS) PRIOR TO ANY EXCAVATION TO OBTAIN ACCURATE UTILITY LOCATIONS.
2. RECORD UTILITY INFORMATION FROM THE VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES ARE APPROXIMATE ONLY AND ACTUAL LOCATIONS MUST BE DETERMINED BY THE CONTRACTOR IN THE FIELD.
3. THE COMPLETION AND ACCURACY OF LATERAL UTILITY SERVICES IS NOT GUARANTEED AND MUST BE VERIFIED BY THE CONTRACTOR IN THE FIELD.
4. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE MUST BE NOTIFIED, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN, (SEE CHAPTER 370, ACTS OF 1963, MASSACHUSETTS) PRIOR TO DESIGNING, EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORING OR REPAVING.
5. SUBSURFACE UTILITY LOCATIONS HAVE BEEN PLOTTED TO MEET UTILITY QUALITY LEVEL "C" AS DESCRIBED IN ASCE STANDARD 38-02 AND SUMMARIZED ON THIS SHEET. THE UNDERGROUND UTILITIES ARE SHOWN IN APPROXIMATE LOCATIONS BASED ON ABOVE-GROUND FIELD OBSERVATION AND EXISTING RECORD INFORMATION RECEIVED FROM UTILITY STAKE-HOLDERS.
6. INVERTS SHOWN ON PLAN ARE NOT GUARANTEED TO BE ACCURATE. DUE TO THE LIMITATIONS OF FIELD OBSERVATION AND SURVEY TECHNIQUES THE INVERTS ARE SHOWN AS APPROXIMATE ONLY AND SHALL NOT BE WARRANTED TO BE CORRECT. ADDITIONAL FIELD INVESTIGATION BY THE CONTRACTOR IS NECESSARY WHERE ACCURATE MEASUREMENTS ARE REQUIRED FOR DESIGN OF CRITICAL AREAS.
7. THE BASEMAP IS TO BE USED FOR THE SPECIFIED PROJECT ONLY AND IS NOT WARRANTED TO BE COMPLETE FOR ANY OTHER FUTURE PROJECTS.
8. THE EXISTING INVERTS ARE SHOWN FOR BIDDING PURPOSES ONLY. ACTUAL INVERT ELEVATIONS SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR PRIOR TO ORDERING STRUCTURES.
9. THE CONTRACTOR SHALL INVESTIGATE ALL UNKNOWN MANHOLES TO DETERMINE OWNERSHIP AND CONTACT THE APPROPRIATE UTILITY AGENCIES TO COORDINATE WORK. THE ENGINEER SHALL BE NOTIFIED OF ANY MANHOLES DETERMINED TO BE PART OF SEWER, DRAIN OR WATER SYSTEMS.
10. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
11. THE CONTRACTOR SHALL EXERCISE EXTREME CARE WHEN EXCAVATING NEAR AND BACKFILLING IN THE VICINITY OF EXISTING UTILITIES. CONTRACTOR SHALL USE HAND EXCAVATION WHERE APPROPRIATE TO PROTECT EXISTING UTILITIES.
12. UNLESS OTHERWISE NOTED OR APPROVED BY THE ENGINEER, THE CONTRACTOR SHALL MAINTAIN ALL EXISTING UTILITIES IN SERVICE AT ALL TIMES. IF THE CONTRACTOR DAMAGES UTILITY SYSTEMS, THEY SHALL IMMEDIATELY NOTIFY THE RESPECTIVE UTILITY COMPANY AND SHALL REPAIR/REPLACE THE AFFECTED SYSTEM AT HIS OWN EXPENSE.
13. THE CONTRACTOR SHALL COORDINATE WITH PRIVATE UTILITY COMPANIES AND MAKE ARRANGEMENTS FOR ADJUSTMENTS, ALTERATIONS, AND REPLACEMENT OF PRIVATE UTILITIES WHICH ARE TO BE DONE BY THE UTILITY COMPANY.
14. THE CONTRACTOR SHALL ALTER THE MASONRY OF THE TOP SECTION OF ALL EXISTING DRAINAGE AND SEWER STRUCTURES AS NECESSARY FOR CHANGES IN GRADE, AND RESET ALL WATER, SEWER, AND DRAINAGE SURFACE CASTINGS (ETC.) WITHIN THE LIMITS OF CONSTRUCTION TO THE PROPOSED FINISH SURFACE GRADE. REQUIRED NEW MASONRY SHALL BE CLAY BRICK CONFORMING TO M4.05.2. IF AN EXISTING UTILITY STRUCTURE WITHIN THE PROJECT LIMITS IS WITHIN A PROPOSED ACCESSIBLE SURFACE, THE STRUCTURE SHALL BE CAREFULLY ADJUSTED SUCH THAT THE TOPMOST SURFACES OR THE STRUCTURE COVER SHALL BE FLUSH WITH THE SURFACE.
15. THE CONTRACTOR SHALL CONSIDER THE INDIVIDUAL SERVICE LINES TO EACH BUILDING FROM ALL UTILITIES, WHETHER MARKED OUT OR NOT, WHEN PROCEEDING WITH EXCAVATION.
16. SURPLUS MATERIALS OBTAINED FROM ANY TYPE OF EXCAVATION, AND ALL EXISTING AND OTHER MATERIALS NOT REQUIRED TO BE REMOVED AND STACKED OR NEEDED FOR USE ON THE PROJECT, AS DETERMINED BY THE ENGINEER, SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF SUBJECT TO THE REGULATIONS AND REQUIREMENTS OF LOCAL AUTHORITIES GOVERNING THE DISPOSAL OF SUCH MATERIALS, AT NO ADDITIONAL COMPENSATION.
17. THE CONTRACTOR SHALL SUPPORT AND PROTECT EXISTING UTILITIES IN AND AROUND EXCAVATIONS, AND, IN PARTICULAR, WHEN CROSSING UNDER OR OVER ANY DUCT OR PIPE. ALL PROTECTIVE MEASURES AND SUPPORTS SHALL BE CONSIDERED INCIDENTAL WORK AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE ITEM BEING INSTALLED.
18. A MINIMUM 24-INCHES OF SEPARATION IS REQUIRED BETWEEN THE GAS MAIN AND DRAINAGE LINE AND ALSO BETWEEN THE GAS MAIN AND WATER MAIN. UTILITY DOES NOT MEET THE MINIMUM SEPARATION REQUIREMENT SHALL GET APPROVAL FROM THE UTILITY COMPANY.
19. PROPOSED WATER MAIN SHALL BE INSTALLED WITH VERTICAL BENDS TO CROSS UNDER EXISTING WATER MAIN TO AVOID CONFLICTS AND CONNECTION FOR THE HYDRANTS.
20. BICYCLE SAFE CASCADE GRATE SHALL BE USED FOR ALL THE INLETS ON CONTINUOUS GRADES. AT LOW POINTS RECTANGULAR BAR GRATES SHALL BE USED.
21. ALL TEMPORARY POLE RELOCATIONS SHALL BE COORDINATED WITH THE UTILITY COMPANIES, TOWN OF WILMINGTON, AND MASSDOT. AT LOCATION ADJACENT TO THE PROPOSED RETAINING WALL FOOTING, ADDITIONAL POLE DEPTH SHALL BE INSTALLED TO PREVENT UNDERMINING FROM EXCAVATION.
22. INSTALLATION OF UTILITY POLE ON THE SIDEWALK ADJACENT TO THE RETAINING WALL SHALL MEET MINIMUM ADA/AAB REQUIREMENTS.

SUMMARY OF UTILITY MAPPING QUALITY LEVELS:

UTILITIES AS SHOWN WERE COMPLIED BASED ON A COMBINATION OF QUALITY LEVEL B, C, AND D INFORMATION. THE FOLLOWING IS A SUMMARY OF THE SURVEY MAPPING LEVELS FOR UTILITIES AS DESCRIBED IN ASCE STANDARD 38-02, "STANDARD GUIDELINE FOR THE DEPICTION OF EXISTING SUBSURFACE UTILITY DATA". THESE GUIDELINES ARE MORE FULLY DESCRIBED IN THE ASCE STANDARD.

UTILITY QUALITY LEVEL A:
PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE (OR VERIFICATION OF PREVIOUSLY EXPOSED AND SURVEYED UTILITIES) AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT. MINIMALLY INTRUSIVE EXCAVATION EQUIPMENT IS TYPICALLY USED TO MINIMIZE THE POTENTIAL FOR UTILITY DAMAGE. A PRECISE HORIZONTAL AND VERTICAL LOCATION, AS WELL AS OTHER UTILITY ATTRIBUTES, IS SHOWN ON PLAN DOCUMENTS. ACCURACY IS TYPICALLY SET TO 15-MM VERTICAL AND TO APPLICABLE HORIZONTAL SURVEY AND MAPPING ACCURACY AS DEFINED OR EXPECTED BY THE PROJECT OWNER.

UTILITY QUALITY LEVEL B:
INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES. QUALITY LEVEL B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. THIS INFORMATION IS SURVEYED TO APPLICABLE TOLERANCES DEFINED BY THE PROJECT AND REDUCED ONTO PLAN DOCUMENTS.

UTILITY QUALITY LEVEL C:
INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D INFORMATION.

UTILITY QUALITY LEVEL D:
INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

GENERAL NOTES:

1. PROPOSED WATER MAIN RELOCATION ADJACENT TO THE ACCESS DRIVE BETWEEN STATION 51+08 LT AND 52+91 LT SHALL BE COMPLETED BEFORE THE ROADWAY AND RETAINING WALL CONSTRUCTION.

WILMINGTON
BUTTERS ROW OVER MBTA

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	3	105
PROJECT FILE NO.	608929		

GENERAL NOTES

WILMINGTON
BUTTERS ROW OVER MBTA

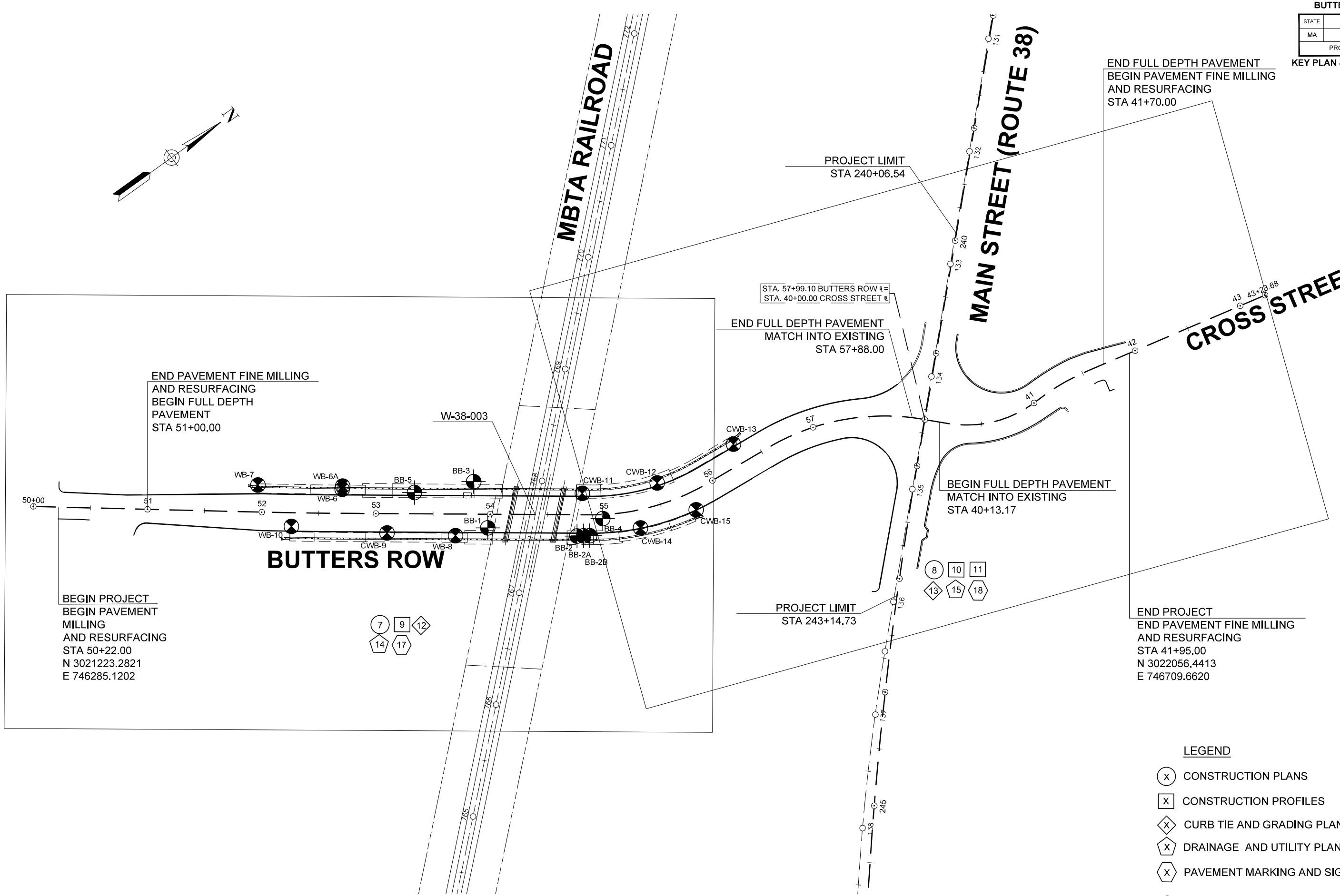
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	105
PROJECT FILE NO.	608929		

KEY PLAN & BORING LOCATION PLAN

608929_HD08(KEY PLAN).DWG Plotted on 16-Dec-2022 3:22 PM

Proposal No. 608929-123406

A000840-225

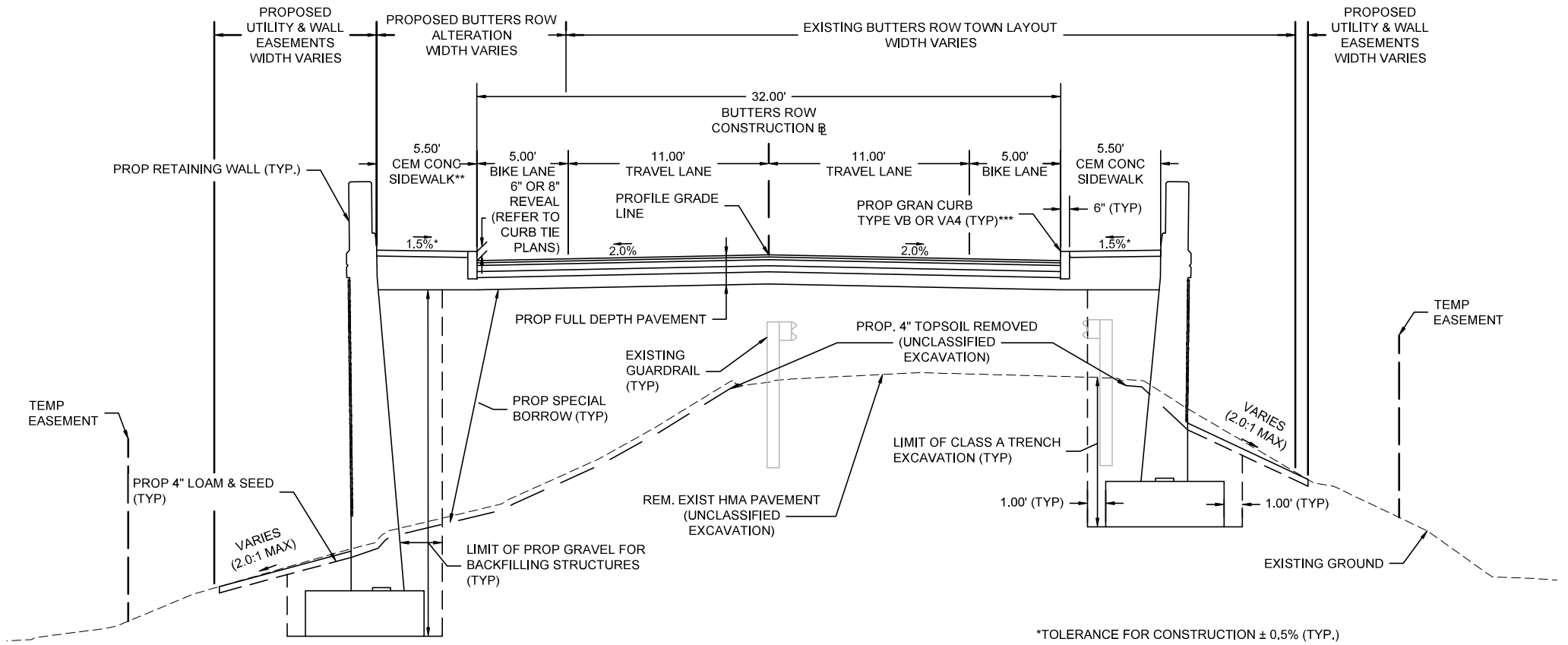


LEGEND

- (X) CONSTRUCTION PLANS
- [X] CONSTRUCTION PROFILES
- ◇X◇ CURB TIE AND GRADING PLANS
- ⬡X⬡ DRAINAGE AND UTILITY PLANS
- ⬡X⬡ PAVEMENT MARKING AND SIGNING PLANS
- WB/CWB WALL BORING (SEE BRIDGE PLANS)
- BB GEOLOGICAL BORING (SEE BRIDGE PLANS)

0 20 40 80
SCALE: 1" = 80'

WQC/ACOE PLANS SHEET 4 OF 23

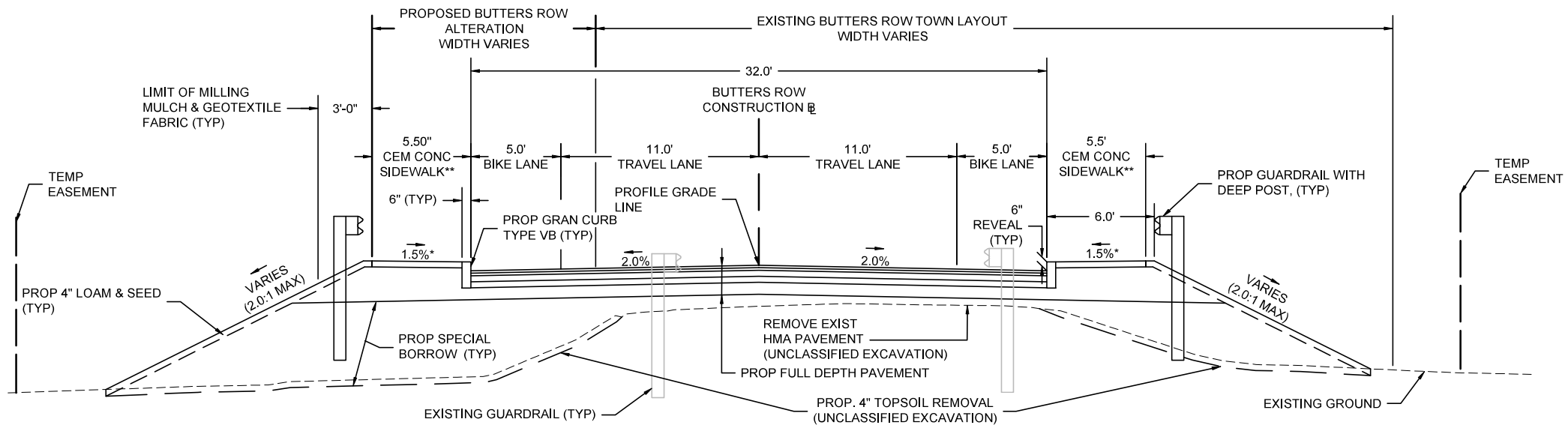


TYPICAL SECTION BUTTERS ROW

STA. 51+90.00 LT TO 56+40.00 LT
STA. 52+20.00 RT TO 55+77.13 RT

SCALE: 1"= 8'

*TOLERANCE FOR CONSTRUCTION ± 0,5% (TYP,)
**PROP CEM CONC SIDEWALK ENDS AT STA 56+00 LT & RT
HMA SIDEWALK BEGINS AT STA 56+00 LT & RT
***LIMIT OF THE BEGINNINGS OF VA4 IS STA 54+04 LT TO 54+80 LT & 53+98 RT TO 54+73 RT



TYPICAL SECTION BUTTERS ROW

STA. 51+00.00 LT TO 51+90.00 LT
STA. 51+00.00 RT TO 52+20.00 RT
STA 55+77.13 RT TO 56+18.00 RT
STA. 56+40.00 LT TO 57+88.00 LT

SCALE: 1"= 8'

*TOLERANCE FOR CONSTRUCTION ± 0.5% (TYP.)
**PROP CEM CONC SIDEWALK ENDS AT STA 56+00 LT & RT
HMA SIDEWALK BEGINS AT STA 56+00 LT & RT

PAVEMENT NOTES

PROPOSED FULL DEPTH PAVEMENT

SURFACE COURSE:	1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER ASPHALT EMULSION FOR TACK COAT OVER 1,75" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER ASPHALT EMULSION FOR TACK COAT OVER
BASE COURSE:	4" SUPERPAVE BASE COURSE 37.5 (SBC-37.5) PLACED IN ONE COURSE
SUBBASE COURSE:	4" DENSE GRADED CRUSHED STONE FOR SUBBASE (COMPACTED) OVER 8" GRAVEL BORROW (TYPE B) (COMPACTED)
SUBGRADE:	SPECIAL BORROW AS REQUIRED BASED ON EXISTING SUBGRADE MATERIALS

PROPOSED BRIDGE PAVEMENT

SURFACE COURSE:	1.5" SUPERPAVE BRIDGE SURFACE COURSE 9.5 POLYMER (SSC - B - 9.5 - P) OVER ASPHALT EMULSION FOR TACK COAT OVER 1.5" SUPERPAVE BRIDGE PROTECTIVE COURSE 12.5 POLYMER (SPC - B - 12.5 - P)

PROPOSED PAVEMENT FINE MILLING & RESURFACING

SURFACE COURSE:	1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER ASPHALT EMULSION FOR TACK COAT (RS-1H) AT 0.09 GAL/SY OVER MILLED SURFACE
MILLING COURSE:	1.5" PAVEMENT FINE MILLING

PROPOSED CEMENT CONCRETE WALK/PEDESTRIAN CURB RAMP

SURFACE COURSE:	4" CEMENT CONCRETE AIR ENTRAINED 4000 PSI, 3/4", 610
FOUNDATION COURSE:	8" GRAVEL BORROW (TYPE B)

PROPOSED CEMENT CONCRETE DRIVEWAY

SURFACE COURSE:	6" CEMENT CONCRETE AIR ENTRAINED 4000 PSI, 3/4", 610
SUBBASE COURSE:	8" GRAVEL BORROW (TYPE B)

PROPOSED HMA DRIVEWAY & ACCESS ROAD

SURFACE COURSE:	1.5" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER
INTERMEDIATE COURSE:	2.5" SUPER PAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)) (SEE NOTE 2)
SUBBASE COURSE:	8" GRAVEL BORROW (TYPE B)
SUBGRADE:	SPECIAL BORROW AS REQUIRED BASED ON EXISTING SUBGRADE MATERIALS

PROPOSED HMA WALK SURFACE

SURFACE COURSE:	1.25" SUPERPAVE SURFACE COURSE - 9.5 (SSC-9.5) OVER
INTERMEDIATE COURSE:	1.75" SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC-12.5)
SUBBASE COURSE:	8" GRAVEL BORROW (TYPE B)

PROPOSED FULL DEPTH PAVEMENT LESS THAN 4 FEET

SURFACE COURSE:	1.5" SUPERPAVE SURFACE COURSE 9.5 (SSC-9.5) OVER ASPHALT EMULSION FOR TACK COAT OVER 1.75" SUPERPAVE INTERMEDIATE COURSE 12.5 (SIC-12.5) OVER ASPHALT EMULSION FOR TACK COAT OVER
BASE COURSE:	6" HIGH EARLY STRENGTH CEMENT CONCRETE BASE COURSE
SUBBASE COURSE:	8" GRAVEL BORROW (TYPE B)

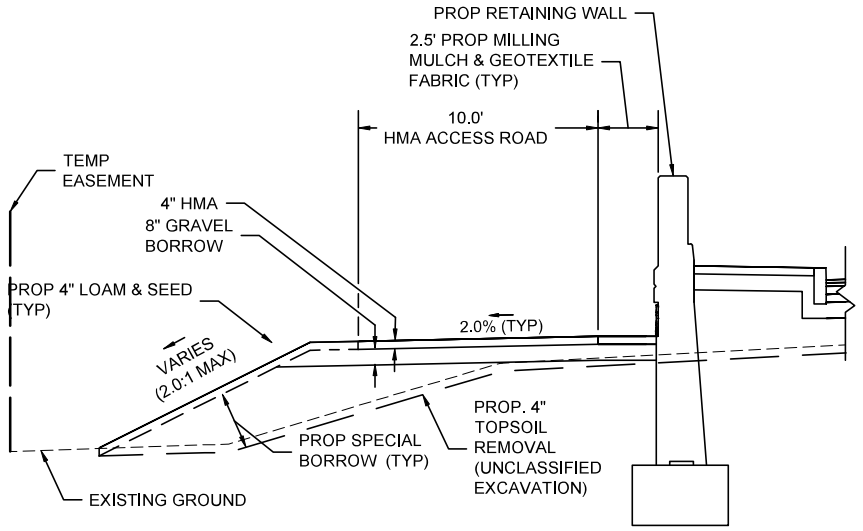
NOTE:
1. TACK COAT SHALL BE APPLIED BETWEEN PAVEMENT LAYERS AT A RATE OF 0.08 GALLONS PER SQUARE YARD AND ON MILLED SURFACES AT A RATE OF 0.09 GALLONS PER SQUARE YARD.TACK COAT AND HMA JOINT SEALER SHALL FOLLOW THE STANDARD SPECIFICATION SUBSECTION 450.

2. DRIVEWAY SUPERPAVE SHALL FOLLOW THE REQUIREMENTS IN THE 2022 SPECIFICATIONS SUBSECTION 702.

WILMINGTON
BUTTERS ROW OVER MBTA

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	105
PROJECT FILE NO.	608929		

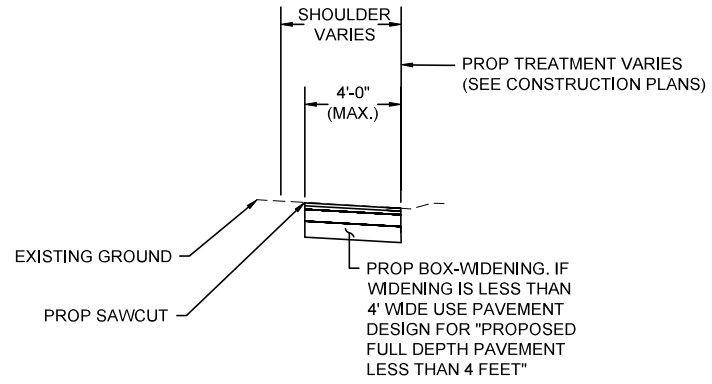
TYPICAL SECTIONS - 2



TYPICAL SECTION ACCESS ROAD

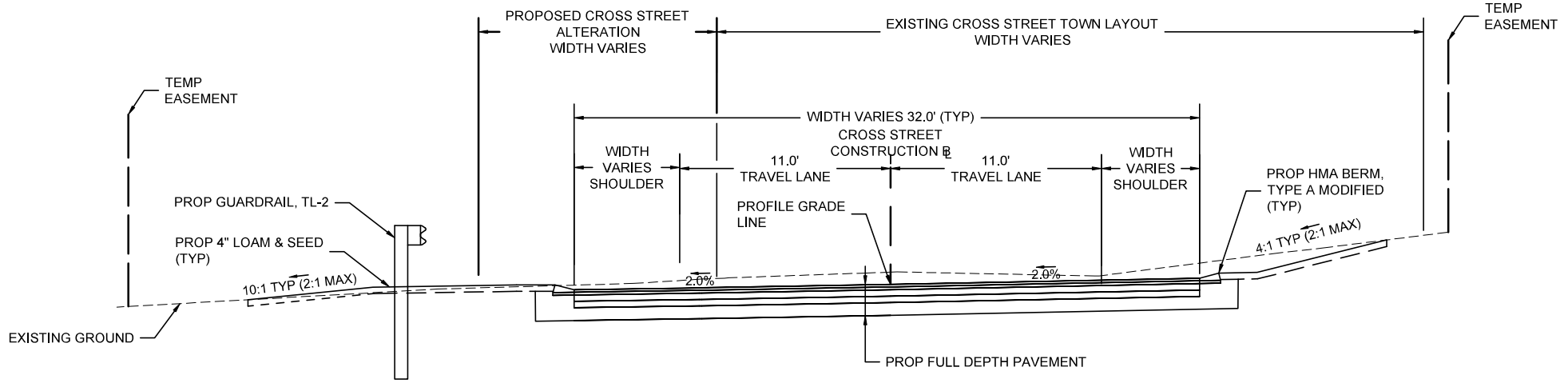
STA. 51+24.00 LT TO 54+10.00 LT

SCALE: 1"= 8'



BOX WIDENING

STA 50+22 LT TO 51+00 LT
STA 50+87 RT TO 51+00 RT
STA 57+85 TO 57+88
STA 40+13 TO 40+16
SCALE: 1"= 8'



TYPICAL SECTION CROSS STREET

STA. 40+24.00 TO 41+70.00

SCALE: 1"= 8'

WQC/ACOE PLANS SHEET 6 OF 23